

1. On the Freshwater Shells of the Island of Socotra collected by Professor I. Bayley Balfour. By Lieut.-Colonel H. H. GODWIN-AUSTEN, F.R.S., F.Z.S. &c.—Part III.

[Received January 16, 1883.]

(Plates I. & II.)

The shells now treated of belong to the genera *Planorbis*, *Hydrobia*, and *Melania*. The first is the only representative of the *Limnæidæ* in Socotra, for the very generally distributed genus *Limnæa* appears certainly absent. The freshwater shells brought home by Professor Balfour are well represented numerically; and a great number of young specimens occurred caught up in the water-plants that were collected; but all are referable to the above genera, and not a single bivalve of any kind was detected among them.

Although three of the species of *Melania* are well known shells with an extended range, and have been often figured in various works, yet they vary much in form, coloration, and sculpture with change of conditions. I have therefore given figures of their Socotran representatives. I think, when we are trying to slowly work out the causes of the distribution of species over certain areas, we cannot be too particular, too minute, and too exact with the species that we are now collecting, and more particularly with island forms. I do not imagine that in Socotra the more or less stagnant pools are large or numerous, or the streams of great extent; and this must be the case with many small islands. The formation of a Military or a Coaling-station is very apt to lead to the destruction of such pieces of water or marshy ground—the one conducted into new channels, the other drained for sanitary purposes, destroying the original molluscan inhabitants together with many of the plants, insects, and other forms of life. Again, the introduction of plants with the occupation of islands by new races, leads to the transport of species from other countries; and as time goes on the history of such aided emigration is lost, and there will be a tendency to weaken original deductions made now on the distribution of species as connected with the former outlines of land and sea. If mere lists of a fauna, with perhaps meagre descriptions only, be drawn up, and a species become extinct and the original collection destroyed, how easy is it to throw doubt on the authenticity and correctness of the record, or the identification of the particular species. When drawings are added there is less possibility of such doubts arising.

The freshwater shells we have before us have certainly more of an Indian character than an African one; and, again, as I pointed out in a previous paper, they extend to Madagascar and the Mascarene Islands to the south. In fact the only species in the present series that has an African habitat is the extremely wide-spread *Melania tuberculata*. *Planorbis cockburni* may be also African; but it is a form of a group of that genus which has a greatly extended range

in time and area. It seems remarkable that four freshwater shells of common and abundant Indian species, only one hitherto known from Africa, should be found isolated in Socotra; and this, I think, is another point in evidence of the area of the Arabian Sea as far south as a line joining Madagascar and Ceylon having been once to a great extent dry land receiving the drainage of the surrounding mountain-ranges, of which Socotra formed a portion of the western watershed and the limit of its freshwater fauna, this watershed being then continuous with the Jebel Yafai and the highlands of Arabia.

Herr von Martens, the recorder of the Molluscan portion of the 'Zoological Record' for 1881, does not quite agree with me in connecting Socotra with Madagascar, considering the species I placed in *Tropidophora* to belong rather to *Lithidion*. On looking again at these shells, the form of the operculum of *T. socotrana* is certainly similar to that of *Otopoma*; but that of *Lithidion* is nearer to *Cyclotopsis* and *Tropidophora* (Arabia and Socotra).

I hope soon to be able to examine the animals of these shells, as Professor Balfour placed some of those collected in spirits, and others were alive when they reached England.

Fam. LIMNÆIDÆ.

PLANORBIS EXUSTUS, var. MACULATUS. (Plate I. figs. 1, 1a, 1b.)

Shell, umbilical region slightly concave, the apical very slightly depressed; sculpture, very fine regular transverse ribbing; colour amber-brown, passing into white, with two or three broadish transverse bands of darker brown, more apparent in bleached specimens; spire very slightly depressed; whorls 4, the last increasing rapidly; aperture widely ovate, descending below and slightly rising above the level of the body-whorl; peristome thin, margins united by a thin deposit on the body-whorl.

Size:—

Major diam. 12·5, minor diam. 9·0, alt. axis 4·5 millim.

„ „ 0·49, „ „ 0·35, „ 0·18 inch.

This species is about the size and has somewhat the form of *P. madagascariensis*, Ed. Smith, figured and described in the P. Z. S. 1882, from Lake Itasy.

Compared with a large series of *P. exustus* from different parts of India, it is rounder on the periphery and smoother than the majority; and none of the Indian examples exhibit the distinct bands of darker colour on the last whorl.

This shell and others of the genus are no doubt really sinistral; but I have figured it as dextral, this being more convenient for comparison with almost all figures hitherto given of this genus.

PLANORBIS SOCOTRENSIS, n. sp. (Plate I. figs. 3, 3a, 3b, 3c.)

Shell minute, discoid, apical and basal sides equally concave; sculpture, obliquely striate with lines of growth, otherwise smooth with very minute pitting or malleation; colour pale ochraceous; suture well impressed; whorls 3, flat on the periphery, angular

above and below, side subvertical; aperture rhomboidal, rather wider than high; peristome thin, continues as a thin callus on the body-whorl, arched above, straight below.

Size:—

Major diam. 3·4, alt. axis 0·5 millim.

„ „ 0·13, „ „ 0·02 inch.

There are unfortunately only two specimens of this curious form in the collection; and these I found when carefully looking over some large tangled pieces of water-plants, which Prof. B. Balfour sent me to examine for this purpose, and which were in the same state as when transferred from the water.

There is a very remarkable resemblance between the general form of this shell and the fossil species *Macrocyclus carnatica* of Stoliczka, which was described and figured from the Upper Cretaceous rocks of the Arrialur group in Southern India (*Palæontologia Indica*, plate i. figs. 8, 8 *a*, 8 *b*, p. 12). The latter is represented as a dextral shell with flat-sided whorls angulate above and below. And if the two shells are compared in this position, it will be seen that the right margin of the periphery differs; the diameter is greater above than below, whereas in *socotrensis* it is the reverse. Stoliczka says that the fossil specimen is much injured by pressure; and a comparison of figs. 8 *a* and 8 *b*, where the periphery is restored, shows it to be more like the Socotran shell. I am inclined to think that this fossil form may be a freshwater shell allied to *Planorbis* and not to the *Zonitidæ*.

PLANORBIS COCKBURNI, n. sp. (Plate I. figs. 2, 2*a*, 2*b*.)

Shell discoid, diaphanous; sculpture, fine oblique striation, almost costulation, on the first whorls; colour pale horny brown; suture impressed; whorls $2\frac{1}{2}$; aperture broadly ovate.

Size:—

Major diam. 4·3, alt. axis 1·1 millim.

„ „ 0·17, „ „ 0·04 inch.

A large number of this species were found, associated with the last. I have named it after Lieut. Cockburn, of the 6th Royal Regiment, who accompanied Prof. Balfour and rendered him so much able assistance.

HYDROBIA (?) *BALFOURI*, n. sp. (Plate I. figs. 4, 5.)

Shell elongately oval; sculpture, quite smooth, a few eroded patches on the apical whorls; colour white, another (smaller) specimen ash-brown; spire high, somewhat attenuate; whorls 5, penultimate the largest, its sides convex; aperture subvertical, broadly ovate or nearly circular; peristome thin, well rounded below; operculum not seen.

Size:—

Major diam. 1·3, alt. apert. 0·9, alt. axis 2·1 millim.

„ „ 0·05, „ „ 0·04, „ „ 0·08 inch.

4. x 12.



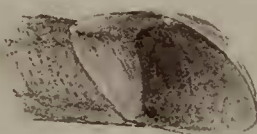
5 x 12



3a.



3c. x 20.



3b.



3. x 7.



2a.



2b.



2. x 7.



1a.



1 x 4.

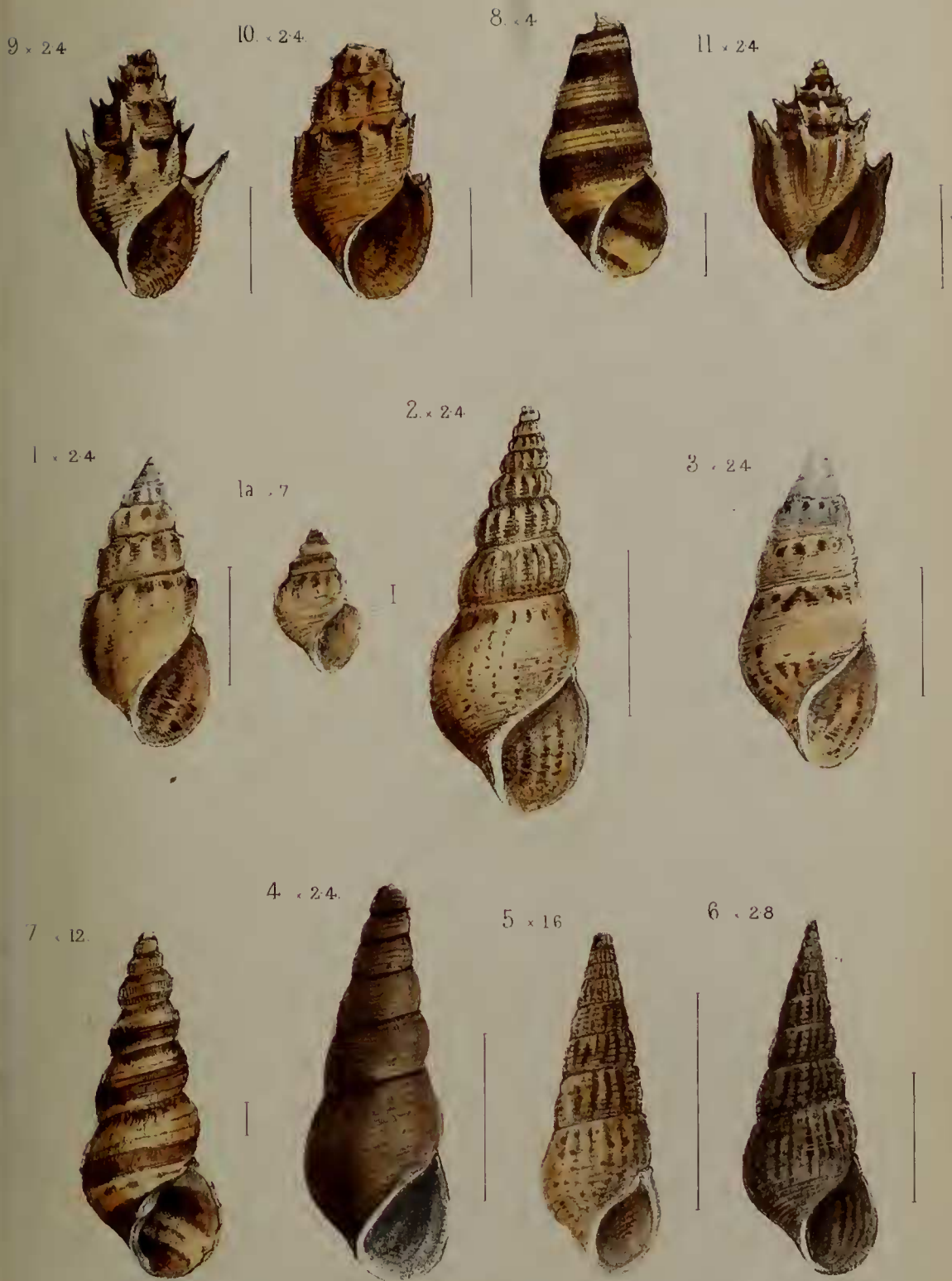


1b.



SOCOTRAN FRESHWATER SHELLS.





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This species appears to be nearest to *H. (Belgrandia) miliacea*, Nevill (J. A. S. B. 1881, pl. vii. fig. 7), from Port Canning on the Mutlah, Sándabuns; but neither the operculum nor animal being known, it is difficult to place it in its correct generic position. I at first considered it a *Bithynia*.

MELANIA TUBERCULATA, Müller. (Plate II. figs. 5, 6.)

Size :—

Largest spec.	Major diam.	9·8,	alt. apert.	9·8,	alt. axis	29·0	millim.
	"	"	0·39,	"	0·39,	"	1·14 inch.
Younger spec.	"	"	6·0,	"	6·0,	"	17·0 millim.
	"	"	0·24,	"	0·24,	"	0·67 inch.

This is a very widely distributed shell. Brot records it from the north, east, and west coasts of Africa, Madagascar and Mauritius, India and Ceylon, Syria, Persia, Mesopotamia, Arabia, Siam; Java and Malta (*Issel*).

MELANIA TUBERCULATA, smooth var. (Plate II. fig. 4.)

The interior of the aperture is milky white, with no splashes or spotting of colour.

Size :—

Major diam.	8·0,	alt. apert.	8·0,	alt. axis	22·5	millim.
"	"	0·31,	"	0·31,	"	0·89 inch.

Similar to fig. 11 c, pl. 26 of Brot's Monograph.

MELANIA SCABRA, Müller. (Plate II. fig. 1.)

Shell turreted, solid; spire high; whorls 6, the last two angulate above; aperture ovate.

Size :—

Major diam.	7·0,	alt. apert.	7·0,	alt. axis	16·4	millim.
"	"	0·28,	"	0·28,	"	0·65 inch.

This shell is identical with specimens in my collection from Kattiawar; it agrees, too, with fig. 14 b, plate 27 of Brot's monograph.

The young shell (Plate II. fig. 1a), when from 2 to 3 mm. long, has 5 whorls, the spines only commencing to be formed on the fourth. The apex is rounded and smooth, carination showing on the second whorl. The columellar margin is of a fine purple colour.

A specimen in spirit, on being broken, was found to contain a dozen of the size above given. This is identical with the young of *M. scabra* from Kattiawar.

MELANIA SCABRA, Müller, var. (Plate II. fig. 2.)

Shell elongately turreted, the last whorl smooth, the apical whorls being deeply sulcate, the intervening varices being very regular; sculpture, spiral ribbing on the last whorl, finer above; colour pale ochraceous, with a few spottings and narrow stripes of dark ruddy brown; spire high, attenuate, apex decollate; suture impressed; whorls 8, apex gone, probably 10 when complete, sides convex;

aperture oval, angular above, narrowly rounded below; peristome thin; columellar margin straight.

Size of largest specimen:—

Major diam. 8·5, alt. apert. 8·5, alt. axis 22·5 millim.

„ „ 0·33, „ 0·33, „ 0·89 inch.

Eight specimens were in the collection, the exact locality not mentioned. It is very similar to examples of *M. scabra* from the Deyra Dhoon, and to fig. 14a, pl. 27 of Brot's Monograph.

MELANIA SCABRA, Müller, var. (Plate II. fig. 3.)

Whorls 6, not angulate above.

Size:—

Major diam. 7·2, alt. apert. 7·2, alt. axis 17·5 millim.

„ „ 0·28, „ 0·28, „ 0·69 inch.

This is another species with an extensive range, but more exclusively Indian and Malayan. Brot gives Timor, Vanikoro, Java, India, Pondichery and Madras, Poona, Cochin China, New Guinea, and Halmaheira (Gilolo), Moluccas. I have it from the Indus and its tributaries in Scinde and the Punjaub, and the Ganges and its tributaries.

MELANIA PAGODA, Lea, var. (Plate II. fig. 9.)

Shell ovately turreted, well-spined; sculpture, well marked carinate spiral ribbing on all the whorls, crossed by fine transverse striæ; colour pale brown, mottled on the last whorl with rich madder-brown; spire high; suture shallow; whorls 6, rather flat, angulate above; spire decollate, 7 spines on the last whorl, sharp-pointed; aperture ovate; peristome thin, rounded below, sinuate on the outer margin.

Size:—

Major diam. 7·0, alt. apert. 7·0, alt. axis 14·0 millim.

„ „ 0·28, „ 0·28, „ 0·55 inch.

This shell is a near ally of the Ceylon *M. datura*, Dohrn¹, on the Indian side, and *M. amarula*, Brug., of Bourbon and Mauritius, Madagascar and Comoro Islands, on the African side, but never yet obtained on the mainland. From the first it differs in its more numerous spines, which are directed upwards and not so obliquely outwards as those of *M. datura*, the form of the spire being the same in both. From the second it is more remote and distinct in its higher spire and less tumid form and lengthened spines, which are apparently shorter and blunter in *M. amarula*. I give a figure (Pl. II. fig. 11) of a Mauritian specimen of this last species, to show better how it differs from the Socotran shell. *M. pagoda*, Lea, from the Philippines, is another very closely allied species to *M. datura*, l.c. plate 28. fig. 5, where both long- and short-spined examples are given. The shell I describe and figure is not fully grown; but it is the finest specimen Professor Balfour obtained. Mr. A. Brot, to

¹ Vide Monograph of the *Melaniæ*, by A. Brot, Syst. Conch. Cab. p. 276, plate 28. figs. 4, 4a 4b, and Conch. Indica, plate 73. fig. 10.

whom I submitted these shells for comparison with those in his fine collection, and who has made this group his especial study, considers it a variety of *M. pagoda*. He remarks:—"Unfortunately young specimens, but quite identical with the form I received from Mauritius, and which I consider is a variety of *M. pagoda*, Lea."

M. datura and *M. pagoda*, both closely allied, it will be seen, range from Mauritius and Socotra to Ceylon and the Philippines.

MELANIA PAGODA, Lea. (Plate II. fig. 10.)

Shell ovately turreted, with short spines, thin; sculpture, well marked carinate spiral ribbing; colour dark brown with some few darker spots; spire high, turreted; whorls 4, decollate, angulate above near suture, sides flat, 15 spinelets on the body-whorl; aperture ovate, rounded below; peristome thin.

Size:—

Major diam. 8, alt. apert. 8, alt. axis 14·5 millim.

„ „ 0·31, „ 0·31, „ 0·56 inch.

This form of the species is represented in Mr. Brot's monograph on plate 28. fig. 5 b.

MELANIA SCLATERI, n. sp. (Plate II. fig. 8.)

Shell not mature, turreted; sculpture, 6 or 7 spiral ribs on each whorl; colour ruddy ochre, with a broad band of black at the suture, which extends some distance on each side; spire elongate; suture shallow; whorls probably 10 when entire, the last whorl rather flat; aperture narrowly ovate.

Size:—

Major diam. 3·8, alt. axis 8·5 millim.

„ „ 0·15, „ 0·33 inch.

The above is from an imperfect specimen with only $3\frac{1}{2}$ whorls; but as the coloration of the shell is so marked, and Mr. Brot says it is unknown to him, I have described it under the above title, and give two figures:—one, of the largest specimen; and the other, of one out of the four or five quite young examples in the collection.

It is similar in coloration to *M. histrionica* of Reeve, which is a variety of *M. balleata* (vide Brot's Monog. p. 364, plate xxxvii. fig. 6); but this species has been placed in another subgenus, *Vibex*, and its form and sculpture are also very different. *M. sclateri* belongs to the group of *M. tuberculata*; and I notice that a Ceylon example of *M. scabra*, figured by Mr. Hanley in the 'Conchologia Indica,' possesses a broad band of colour on the last whorl. I have named this species after Dr. Sclater; for it is entirely owing to his exertions in organizing the expedition that we know so much of the extremely interesting fauna of the island of Socotra.

MELANIA SCLATERI, jun. (Plate II. fig. 7.)

Shell very young, elongately turreted; sculpture, four distinct spiral ribs; colour ochraceous, with a broad dark band on each whorl

just above the suture, and a line of spots in the pale interval on the last whorl; spire attenuate; suture well impressed; whorls 7, sides well rounded; aperture ovate; the ridge in the centre of the columellar margin. The basal portion of a previous aperture may be noticed occasionally in young specimens of *Melania*.

Size:—

Major diam.	1·6,	alt. apert.	1·3,	alt. axis	4·0 millim.
„ „	0·06,	„	0·05,	„	0·16 inch.

EXPLANATION OF THE PLATES.

PLATE I.

- Figs. 1, 1 a, 1 b. *Planorbis exustus*, var. *maculatus*, p. 3.
 2, 2 a, 2 b. — *cockburnii*, n. sp., p. 4.
 3, 3 a, 3 b, 3 c. *Planorbis socotrensis*, n. sp., p. 3.
 4, 5. *Hydrobia* (?) *balfouri*, n. sp., p. 4.

PLATE II.

- Figs. 1, 1 a, 2, 3. *Melania scabra*, pp. 5, 6.
 4, 5, 6. — *tuberculata*, p. 5.
 7, 8. — *slateri*, p. 7.
 9, 10. — *pagoda*, pp. 6, 7.
 11. — *amarula*, p. 7.

2. On the Right Cardiac Valve of *Echidna* and of *Ornithorhynchus*. By E. RAY LANKESTER, M.A., F.R.S., Jodrell Professor of Zoology in University College, London.

[Received January 14, 1883.]

(Plates III. & IV.)

Since I had the honour of placing before the Society the results obtained by the examination of the hearts of two specimens of *Ornithorhynchus* in last June (Proc. Zool. Soc. 1882, p. 549), I have been enabled by the kindness of friends to extend my observations upon the structure of the right cardiac valve in the Monotremata. On the one hand, Professor Flower has very kindly allowed me to examine the hearts of two specimens of *Echidna australis* belonging to the museum of the Royal College of Surgeons; and on the other hand, the late Professor Frank Balfour placed in my hands six specimens of *Ornithorhynchus paradoxus* preserved in spirit, whilst an additional specimen of the heart of *Ornithorhynchus* (making nine in all) was communicated to me by Dr. Pye Smith.

Additional Specimens of Ornithorhynchus-hearts.—In my former paper it was shown that the right cardiac valve differed considerably in the two *Ornithorhynchus*-hearts then described; and it was inferred, from the descriptions given by those authors, that the hearts examined respectively by Owen and by Gegenbaur differed in respect of their right cardiac valve from either of the hearts examined by me.

Heart No. 1 of my former paper presented, besides a large anterior

muscular column (*a* in fig. 12, pl. xl.) dividing the anterior membranous flap of the valve into right and left cusps, a single well-marked right anterior column (*b* in fig. 12, pl. xl.), from which was given off posteriorly a small "septal flap" (*pc* in figs. 14, 15, pl. xl.) representing the septal membranous flap of a typical mammalian right cardiac valve in a very reduced state.

Heart No. 2 differed in two chief features from heart No. 1. First, the right anterior muscular column was broken up into three small slips instead of being present in one piece (*b b b* in fig. 13, pl. xl.), and two peculiar additional muscular slips (*m, n*) were developed in the same region; whilst, secondly, there was no trace of any thing which could be properly called even a rudiment of the septal membranous flap of the valve, although the point of junction of the right border of the membranous part of the valve with the wall of the heart was indicated as a bare representative of such septal extension.

The seven hearts since examined present further variations.

The heart lent to me by Dr. Pye Smith has a closely similar arrangement of the muscular bands and membrane of the right cardiac valve to that exhibited by my No. 1. It differs in having a *smaller* rudiment of the septal valve than my heart No. 1.

Of Professor Balfour's specimens four agree more or less closely with heart No. 2 of my former paper. The most extreme of these is represented in Plate III. fig. 4, where it is seen that not only is the right anterior muscular column represented by separate muscular slips, but these are very small. There is a curious downward growth of the membranous substance of the valve in this region, and an adhesion of the vertically extended membrane to the septal wall of the heart (Plate III. fig. 4, *xc*), which is similar to the condition of the same part in the *Echidna*-heart (Plate IV. figs. 6, 7, *xc*). The important feature about this *Ornithorhynchus*-heart, beyond the absence of a septal valve-flap, is the evanescence of the muscular substance of the right anterior column.

In most marked contrast to this are the two other hearts of Professor Balfour's six specimens. In both these the region of the right cardiac valve, corresponding to the right anterior muscular column of my heart No. 1, is particularly fleshy. In Plate III. figs. 1, 2, 3, the more remarkably developed of these two hearts is drawn. It will be seen that the right extremity of the valve is not merely traversed by a muscular column, but it has additional muscular substance developed in it, so that it presents the aspect of a broad fleshy area (Plate III. figs. 1, 2, 3, *b, b*) with no membrane on its outer or extreme right border. The muscular substance, in fact, rises up in a broad sheet from the wall of the ventricle and is inserted into the anterior part of the auriculo-ventricular ring in a form which resembles that of the fleshy Sauropsidan right cardiac valve more strikingly than does that presented by any other of the specimens examined.

The membrane in this heart is reduced very considerably in proportional area as compared with muscle: a little further development of muscular substance would bring about the union of the right lateral muscular mass, *bb*, with the great anterior muscular column, *a*.

No trace of a septal membranous valve-flap exists in this heart.

It is a noteworthy fact, in view of the statement which has been made by Gegenbaur as to the existence of a septal portion to the right cardiac valve of *Ornithorhynchus*, that, in the nine specimens examined by me, only two, No. 1 (of my former paper) and Dr. Pye Smith's specimen, have any thing entitled to be called a septal flap; and in both these cases it is exceedingly small, fringing one third only or less of the septal margin of the auriculo-ventricular ostium.

In seven of the hearts examined a septal portion of the valve was not present.

Comparison with the Right Cardiac Valve of Casuarius and Crocodilus.—I have introduced, in the Plates illustrating this note, drawings (carefully prepared from dissections in my possession) showing the right cardiac valve of the Cassowary (Plate III. figs. 5, 6) and the corresponding structure of the Crocodile (Plate IV. figs. 1, 2).

Both are prominently distinguished from the corresponding structure in *Ornithorhynchus* by having the anterior flap of the valve entirely muscular; no membranous area is present in that flap, either in Cassowary or Crocodile.

The Crocodile's right cardiac valve consists of two nearly equally large flaps or lobes, an anterior (Plate IV. figs. 1, 2, *a*) and a septal (*pp*). The anterior portion of this valve is comparable with the fleshy masses *bb* and *a* of the *Ornithorhynchus*-heart drawn in Plate III. fig. 1; but there is absolutely nothing in the heart of *Ornithorhynchus* which has any relation to the septal flap, *pp*, of the Crocodile's heart, excepting the rudiment mentioned above as found in only two hearts out of nine. The septal flap in the Crocodile is larger than the anterior muscular flap, and is almost entirely membranous. Its septal face, however, is invaded to a certain extent by small muscular bands.

I cannot consider that Gegenbaur is correct in indicating a correspondence between the structure of the right cardiac valve in *Ornithorhynchus* and *Crocodilus* closer than that which obtains between the Monotreme and other Sauropsida with fleshy right cardiac valve.

On the other hand, in the bird's right cardiac valve, Plate III. figs. 5 and 6, we find no septal lobe (either membranous or muscular) to vitiate the comparison with that of *Ornithorhynchus*; and I must maintain that Prof. Owen was more correct in pointing out resemblances between the right cardiac valve of *Ornithorhynchus* and that of birds than Gegenbaur has been in assimilating the former to the corresponding structure in Crocodiles. The agreement, such as it is, by no means tends necessarily to indicate any special morphological relationship between *Ornithorhynchus* and birds, which have been conclusively shown by Huxley and by Gegenbaur to have no nearer genealogical meeting-point than in the forefathers of the common ancestor of Sauropsida.

The specialization and separation from the ventricular wall of the muscular slip *e* in the Cassowary's heart is a marked modification of a part which can be traced in the mammalian heart (see former paper pl. xl. *e*). The fact that in the bird the muscular substance of the

large mass *a b* runs upwards to the auricular ostium from the outer or free ventricular wall rather than from the ventricular septum, as in *Ornithorhynchus* and other Mammals, appears to me to have very little importance. The moulding of the ventricular cavities may very readily result in an apparent dislocation of parts, so as to give the muscular upgrowths of the ventricular wall at one time a septal, at another time a free-wall attachment. This variation is seen in higher mammalian hearts, as for instance in the Seal (*Phoca vitulina*), where important musculi papillares are attached, not (as is usual) to the septal, but to the free ventricular wall.

Lumen of the Right Ventricle in Ornithorhynchus.—In figs. 3 and 4 of Plate IV. sections are represented taken across the ventricles of the heart of *Ornithorhynchus* and *Lepus*. The drawings are intended to show the Sauropsidan character of the heart of *Ornithorhynchus*, in that its right ventricle appears thus in section as a crescentic sac embracing the very thick-walled cylindrical left ventricle, as in Birds and Reptiles, whilst in the normal Mammalia as represented by *Lepus* the right ventricle does not embrace the left ventricle so closely, and presents, instead of a strongly convex septal wall, a nearly plane one.

Right Cardiac Valve of Echidna hystrix.—I am not acquainted with any figure of the right cardiac valve of the second genus of Monotreme Mammalia, *Echidna*. Prof. Owen, in vol. iii. of his 'Anatomy of Vertebrates,' p. 517, thus describes it:—"The tricuspid valve is membranous and consists of one principal portion closing the outer angle; the free margin of the valve is attached to the extremity of a large fleshy column arising by different roots from both the fixed and the free walls of the ventricle; a short fleshy column is attached to the left extremity of the valve; some chordæ tendineæ are fixed to its right angle." The membranous character of the valve and "the large fleshy column (*a*) arising by different roots (*x* and *y*)" will be recognized in the drawings on Plate IV. figs. 5, 6, 7. I am not able any further to identify in the hearts kindly placed at my disposal by Professor Flower the other features mentioned by Professor Owen.

As compared with the hearts of *Ornithorhynchus* already described, the two *Echidna*-hearts present one important difference. The membranous substance of the valve is not traversed by the muscular columns or musculi papillares connected with it. These muscular columns are simply inserted into or fixed to the membrane, and do not, as in *Ornithorhynchus*, pass upwards through it so as to be inserted into the auriculo-ventricular ring. Membrane alone depends from that ring, as in the Marsupial and Placental Mammalia. At the same time an equally important agreement with *Ornithorhynchus* and difference from other Mammalia is presented by *Echidna* in a leading feature of the construction of its right cardiac valve. This feature is the total absence (in the two specimens studied by me) of a septal flap. This character is clearly exhibited in the three dissections drawn in Plate IV. figs. 5, 6, 7.

The muscular columns (musculi papillares) agree pretty closely with those of some *Ornithorhynchus*-hearts in number and origin

from the ventricular wall. There is a great anterior muscle *a*, and two right anterior muscles *b b*. Near the pulmonary artery (left angle) there is a well-marked left anterior or "conal" muscle as in *Ornithorhynchus* (see pl. xl. of former paper, *e*).

Whilst these papillary muscles of *Echidna* differ from those of *Ornithorhynchus* in not traversing the membranous valve so as to reach the auriculo-ventricular ring, it would be wrong to suppose that they are attached to the membranous valve by chordæ tendineæ as in Marsupials and Placentals. They are not so, but are distinctly intermediate in the character of their attachment between *Ornithorhynchus* and the other Mammalia. The great anterior muscle is wedged into the membrane of the valve (see Plate IV. fig. 6). The adjacent right anterior papillary muscle has two slips of the membrane of the valve reaching down to it, approaching in character true chordæ tendineæ, whilst the extreme right papillary muscle (*b'*) is wedged into the membrane, as is the great anterior column. The connexion between the muscle, *e*, and the membrane is also direct.

The form of the ventricles of the *Echidna*'s heart is more pointed towards the apex than in the *Ornithorhynchus* and thus more bird-like. The septal wall of the right ventricle is even more convex than in *Ornithorhynchus*, and shows more numerous muscular ridges (columnæ carneæ.)

Generalization as to Heart of Monotremata.—We are now in a position to formulate as a distinctive character of the Monotremata amongst Mammalia a peculiarity of the right cardiac valve. This is *not* its muscular constitution, but the deficiency of a septal flap. Less important is the absence of chordæ tendineæ from the valve in both *Echidna* and *Ornithorhynchus*, and the close adhesion of the muscular substance of the papillary muscles to the membrane of the valve. In *Ornithorhynchus*, but not in *Echidna*, contrary to what is observed in other mammals, the muscular tissue of the papillary muscles invades in greater or less quantity the membranous valve, and is continued as one or more varying muscular columns traversing the membrane, to be inserted directly into the auriculo-ventricular tendinous ring.

Considerations derived from the Facts of actual Development.—An admirable memoir by Dr. A. C. Bernays, of St. Louis, Missouri, on the "Developmental History of the Atrio-ventricular valves," is published in the second volume (1876) of Gegenbaur's 'Morphologisches Jahrbuch,' and has come to my knowledge since writing the account of my observations given above.

Dr. Bernays's memoir is a careful exposition of facts, brought together under the direction of Gegenbaur, with the view of giving a detailed basis for the conclusion already formulated by that philosophic anatomist, viz. that "the atrio-ventricular valves are, together with the chordæ tendineæ, (actually in individual development) differentiations of a part of the original muscular network forming the wall of the ventricle." In accordance with this conclusion, Gegenbaur has already, in his 'Elements of Comparative Anatomy,' observed that the muscular right atrio-ventricular valve of *Ornitho-*

rhynchus presents, in the adult, a condition which is common to all Mammalia as a transient phase of embryonic development.

Dr. Bernays distinguishes four stages in the ontogeny (actual development) of the mammalian atrio-ventricular valves. In stage no. 1 he finds valve-like processes of the wall of the heart which are simply projections of the endocardium, and have nothing to do with the ventricular musculature. Such valves are comparable to the watch-pocket valves of the Fish and Amphibian heart. In stage no. 2 a relation is established between these endocardial processes and the musculature of the heart by the growth of muscular bands on their under surface. In stage no. 3 the muscular bands connected with the endocardial processes attain a relatively very great size, and effectively constitute the valve, the original endocardial processes becoming unimportant by their relative diminution in size; thus a *secondary* atrio-ventricular valve of muscular composition arises. In stage no. 4 the degeneration of the muscular tissue and its replacement by membrane is effected, and first the membranous condition of the flaps, then of the chordæ connecting the flaps with the remnant of the muscular tissue now known as papillary muscles, is brought about; thus the purely muscular secondary valve becomes membranous, whilst only the papillary muscles are left to tell of its original condition.

As Bernays has pointed out, the right cardiac valve of *Ornithorhynchus* corresponds to the third stage of the mammalian ontogenetic development, whilst the left cardiac valve of that animal corresponds to the commencement of the fourth stage, in which the muscular tissue has disappeared from the upper portion of the valve, but the attached portion of the papillary muscles has not yet broken up into chordæ tendineæ.

Whilst confirming this distinction between the right and left cardiac valves of *Ornithorhynchus* (see my former paper for a figure of the left cardiac valve), I would further emphasize the fact that the condition of the right cardiac valve in *Echidna* is precisely that described by Bernays as the commencement of his fourth stage. Bernays figures (plate xxxii. fig. 6) an adult human heart, in which one of the papillary muscles of the right ventricle has precisely that direct attachment to the membranous part of the valve and deficiency of chordæ tendineæ which I have described as characterising *Echidna's* right cardiac valve. *Echidna* is thus, when judged by the series afforded by the facts of ontogenesis, distinctly intermediate in this respect between *Ornithorhynchus* and the higher Mammalia.

We may further inquire what light the ontogenesis of the mammalian heart throws upon the absence of the septal flap in the Monotremata. It appears that the consideration of ontogenesis enhances the importance of the distinction between Monotremes and other mammals afforded by this character. According to Bernays the Crocodile-heart is in the second stage of development. The membrane of the large septal valve is not due to the degeneration of a secondary muscular valve, but is the primary endocardial valve;

the muscular bands found on its deep septal face (noted above in my description of it) are the incipient attachments of the ventricular muscular wall described as characterizing the second stage of development of the mammalian heart (see above). Accordingly we have no reason for regarding the minute rudiment of a septal flap which occurs in some *Ornithorhynchus*-hearts as corresponding to the septal flap of the Crocodile's right ventricle. There is no ground for regarding that rudiment as a part of the primary endocardial valve. It is rather an incipient and abnormal extension of the secondary valve, the muscular trabeculæ involved in the development of the secondary valve being, in these cases, widely connected so as to encroach on the septal face of the ventricle in place of being restricted completely to the anterior face. Between this condition and that of the fully formed septal flap of other mammals there is a wide gap.

There seem to be no facts which would lead one to trace the Monotreme-heart to an ancestor in which the secondary muscular valve was fully developed both in its anterior and its septal portions. From such an ancestor it would, no doubt, be *possible* to derive the Monotremes, on the one hand, by suppression of the septal portion, and the other Mammalia, on the other hand, by retention of the whole valve with degeneration of its muscular substance. But in view of the fact that the secondary muscular valve is *not* found to develop a septal portion in any other Vertebrates than the higher Mammalia, it is more probable that the ancestor of the Monotremes had no such septal development, that the rudiment of such septal development found in rare cases in Monotreme-hearts is an *incipient* rudiment, and that the full development of the septal half of the secondary right cardiac valve (in Bernays's sense) is a new departure and special characteristic of the non-cloacal Mammalia.

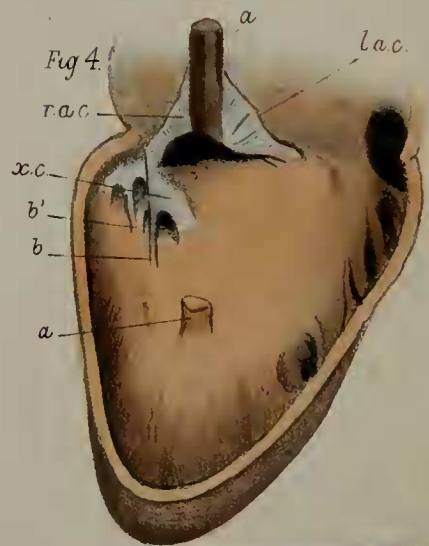
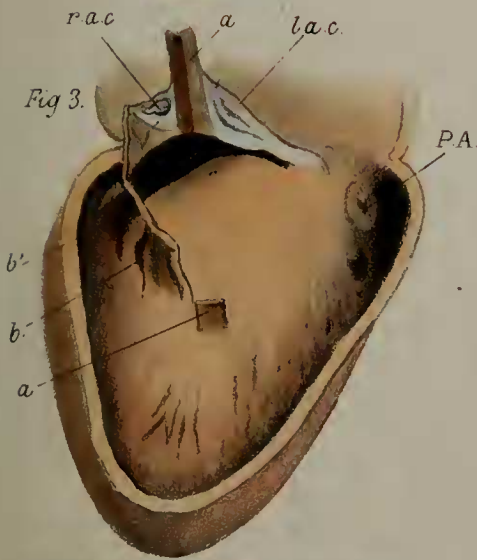
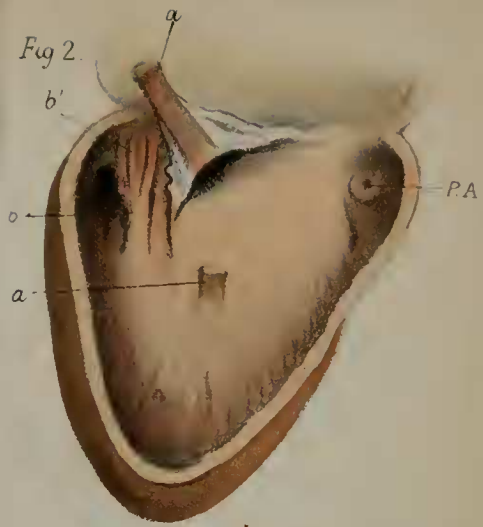
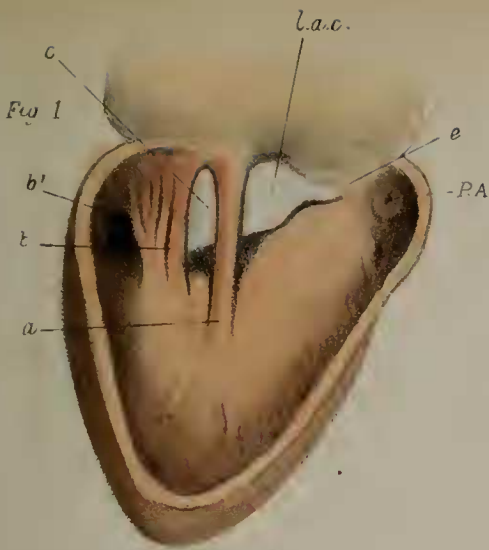
EXPLANATION OF PLATES III. and IV.

Letters in both Plates.

- a.* Great anterior muscular column or papillary muscle.
- b.* Right anterior muscular column.
- b'.* Second (extreme) right anterior muscular column.
- e.* Left anterior or "conal" muscular column.
- x, y.* Columnæ carneæ connecting the base of the great anterior muscular column with the anterior ventricular wall.
- rac.* Right anterior membranous cusp.
- lac.* Left anterior membranous cusp.
- xc.* Downward vertical extension and attachment of the membrane of the valve (possibly to be regarded as a rudiment of a septal flap).
- pp.* Membranous septal flap of the right cardiac valve of the Crocodile.
- PA.* Base of pulmonary artery.
- RV.* Right ventricle.
- LV.* Left ventricle.

PLATE III.

- Figs. 1, 2, 3. Three dissections of the right ventricle of a heart of *Ornithorhynchus*.
- 4. Similar dissection to fig. 2, of another heart of *Ornithorhynchus*.
 - 5. Right ventricle of the Cassowary.
 - 6. The same with the cardiac valve divided.





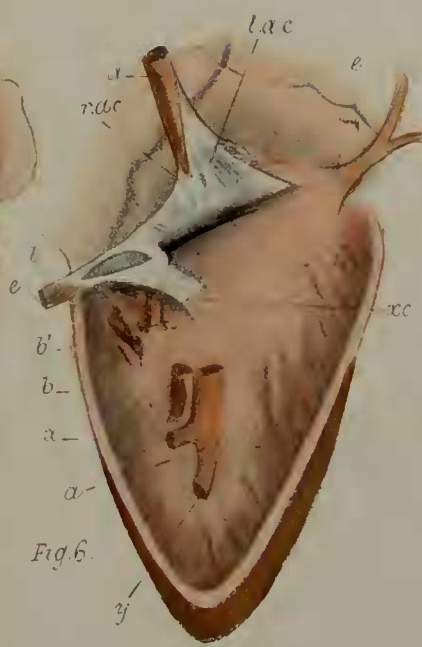
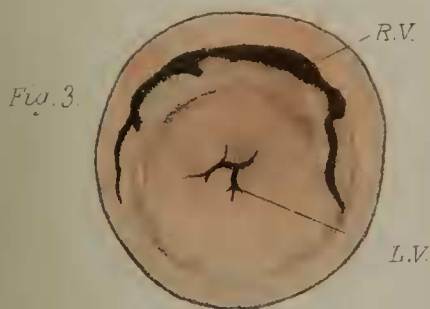
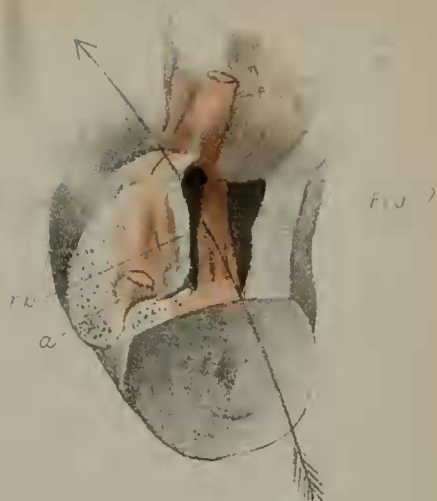




PLATE IV.

- Fig. 1. Portions of the right ventricle of a Crocodile, dissected to show the cardiac valve.
 2. The same with the fleshy valve *a* divided, exposing the subjacent membranous flap, *pp*.
 3. Transverse section of the ventricles of *Ornithorhynchus*.
 4. A similar section of a Rabbit's heart.
 5, 6, 7. Three dissections of the right ventricle of the heart of an *Echidna*.

3. Descriptions of new Genera and Species of Asiatic Lepidoptera Heterocera. By F. MOORE, F.Z.S.

[Received December 14, 1882.]

(Plates V. & VI.)

Fam. CHALCOSIIDÆ.

HISTIA FRATERNA, n. sp.

Allied to *H. papilionaria*, Guér. *Female*. Fore wing similar; hind wing differs in having, on both the upper and under side, a narrower band extending from the costal vein across the disk beyond the cell to the first internal vein, the band being also of a creamy-white colour.

Expanse $3\frac{1}{4}$ inches.

Hab. Calcutta (*Hocking*). In coll. British Museum.

Fam. CALLIDULIDÆ.

CLEOSIRIS FASCIATA, n. sp.

Brownish-ferruginous: fore wing with a prominent yellow, irregular-bordered, transverse medial discal fascia; underside yellow, with similar red strigæ and transverse fasciæ as in *C. catamita*, the fasciæ being of a brighter red, the cell-spots red and more distinct.

Expanse $1\frac{4}{5}$ inch.

Hab. Borneo. In coll. F. Moore.

In this species both wings are much less acuminate at the angles than in *C. catamita*.

CLEOSIRIS MAJOR, n. sp.

Allied to *C. catamita*. Of larger size than typical specimens from Java, Ceylon, and S. India. Fore wing more acutely produced at the apex. Underside of a much duller tinge of ferruginous yellow, the strigæ and transverse fascia from apex brown, the outer borders with a broad zigzag brown fascia; cell-spots dark brown.

Expanse $1\frac{6}{8}$ inch.

Hab. N. India. In coll. F. Moore.

Fam. ARCTIIDÆ.

ALOA MARGINATA, n. sp. (Plate V. fig. 1.)

Female. Comparatively larger and with broader wings than in

A. lactinea: fore wing with narrower costal vermilion-red band; a small black spot at upper end of the cell, another at the base between upper and middle median veins, two on the submedian vein at about one third the length apart: hind wing with a moderately broad black continuous marginal band, and a large broad lunule at end of the cell. Collar and vertex vermilion; abdomen with orange-yellow and black segmental bands, of which the upper and lower black bands are broadest; side of abdomen also black; palpi beneath and fore and mid femora above vermilion; palpi above and two streaks on pectus black; femora at tip, streak down tibiæ, and bands on tarsi black.

Expanse $2\frac{3}{4}$ inches.

Hab. Nepal (*Gen. Ramsay*). In coll. F. Moore.

FAM. NOTODONTIDÆ.

The name *Corma*, which I proposed in P. Z. S. 1881, p. 326, has been previously used by Mr. Walker for a genus of Chalcosiidæ. I therefore substitute AMBADRA: the two species cited by me under *Corma* will now stand as

AMBADRA HORSFELDII.

Eumeta horsfieldii, Moore, Catal. Lep. E.I. C. ii. p. 430 (1859).

Hab. Java.

AMBADRA RAFFLESII.

Eumeta rafflesii, Moore, Catal. Lep. E.I. C. ii. p. 430 (1859).

Hab. Java.

BARADESA, n. g.

Fore wing long, narrow, costa slightly arched, apex acute; exterior margin oblique, posterior angle convex; first subcostal emitted at nearly one half before end of the cell, second from close to the end, trifid, third thrown off at two thirds, fourth at three fifths, fifth from end of the cell and joined to second at one third its length by a short spur; upper discocellular oblique and concave at lower end, lower discocellular concave; upper radial thrown off from the fifth subcostal at one half distance beyond end of the cell and its juncture with the second subcostal, lower radial from middle of discocellulars; upper median branch from end of the cell, middle median from near the end, lower median from one third before the end; submedian curved at the base. Hind wing large, broadly triangular, costa slightly arched towards the base, apex extending beyond posterior angle of fore wing, exterior margin waved and convex in the middle, abdominal margin short; cell short; two subcostal branches on a foot-stalk beyond the cell; upper and lower discocellulars concave, radial from the angle in their middle; two upper medians from immediately beyond the cell, lower at one third before the end; submedian and internal veins straight. Body long, thorax laxly pilose; palpi ascending,

second joint densely pilose in front, third joint short, thick; femora pilose beneath, tibiæ thickish and compactly pilose, fore tibiæ tufted beneath; antennæ long, finely pectinated.

BARADESA LITHOSIODES, n. sp. (Plate V. fig. 2.)

Male. Fore wing deep rufous-brown, indistinctly streaked with ochreous longitudinally through the cell and above the posterior margin; some black sinuous streaks across the base, and others before the middle; three or four irregular oblique series of discal spots, and a marginal row of double dots: hind wing ochreous-yellow, with a broad ochreous-brown marginal band; cilia yellow. Thorax, head, palpi, and legs rufous-brown; abdomen yellow, with a broad dorsal band on the three anal segments.

Expanse $3\frac{5}{8}$ inches.

Hab. Darjiling. In coll. F. Moore and Dr. Staudinger.

Fam. LIPARIDÆ.

LYMANTRIA FULIGINOSA, n. sp.

Allied to *L. pusilla*, Felder (Nov. Voy. pl. 99. f. 3). *Male*. Fore wing with fuliginous-black transverse sinuous bands and spots, their interspaces ochreous-grey: hind wing dull yellowish-ochreous, with a broad, irregular-bordered fuliginous-black marginal band, this colour also indistinctly pervading the anterior border. *Female*. Fore wing with broad transverse confluent sinuous bands, their interspaces greyish white: hind wing fuliginous black, with an ill-defined whitish discal macular fascia. Thorax fuliginous in male, white in female, with a blackish frontal and central spot; abdomen ochreous, with indistinct blackish dorsal and lateral spots.

Expanse ♂ $1\frac{5}{8}$, ♀ $2\frac{5}{8}$ inches.

Hab. Bombay (*Dr. Leith*). In coll. F. Moore.

Genus TRISULOIDES.

Trisuloides, Butler, Ann. Nat. Hist. 1881, vii. p. 36.

TRISULOIDES CATOCALINA, n. sp.

Female. Allied to *T. sericea*, Butler. Of larger size: fore wing darker chestnut-brown, the basal area sparsely grey-speckled, crossed by a subbasal black, zigzag, pale ochreous-bordered line, a curved discal sinuous pale-bordered line, and an outer densely grey-speckled blackish sinuous-margined fascia, the outer border of the wing being slightly ochreous, and with a marginal black lunular line; an orbicular and reniform black mark: hind wing pale chestnut-brown, with a broad medial transverse ochreous-yellow band; a linear series of slender whitish lunules from anal angle. Thorax hoary, with chestnut-brown hindward tufts; abdomen brown, with dorsal chestnut-brown tufts; palpi and legs hoary. Underside dull chestnut-brown, the lower basal and discal area ochreous-yellow; apex grey-speckled: hind wing with a broad lower medial ochreous-

yellow fascia, crossed by a blackish irregular line; outer area of wing grey-speckled.

Expanse 3 inches.

Hab. Darjiling. In coll. Dr. Staudinger.

Genus THAUMATOPŒA, Hübner.

Cnethocampa, Stephens.

THAUMATOPŒA CHEELA, n. sp. (Plate V. figs. 3 ♂, 3 ♀.)

Male. Fore wing brownish grey, sparsely white-scaled, the scales disposed longitudinally; crossed by a basal, an antemedial, and a postmedial zigzag black line, each line being distinctly bordered by ochreous-yellow; cilia alternated with greyish white: hind wing paler. Body greyish-brown, abdomen with ochreous-yellow segmental bands; femora and tibiæ thickly clothed with long silky greyish-brown hair; tarsi and antennæ ochreous-yellow. *Female* darker brownish grey, the transverse yellow-bordered lines less distinct; thorax and abdominal tuft darker brown.

Expanse, ♂ $1\frac{2}{8}$, ♀ $1\frac{3}{8}$ inch.

Hab. Umballa district (*Captain B. Reed*). In coll. F. Moore.

Most nearly allied to the European *T. pinivora*.

Fam. LASIOCAMPIDÆ.

TARAGAMA INTENSA, n. sp. (Plate V. fig. 4.)

Male. Deep bright red: fore wing with an oblique undulated post-medial ochreous-white line, and a similar-coloured triangular spot on the costa above end of the cell: hind wing with a slight ochreous-white fascia from anal angle. Body red, head and front of thorax reddish-grey; antennæ, palpi beneath, and legs above red; cilia ochreous-white.

Expanse $1\frac{3}{4}$ inch.

Hab. N.E. Bengal (*A. E. Russell*). In coll. F. Moore.

TARAGAMA HYPERANTHERÆ, n. sp. (Plate V. fig. 5.)

Male. Dark chestnut-red: fore wing grey-speckled along the costal border and broadly along exterior margin, crossed by two greyish-ochreous transverse undulated medial lines, the lower discal interspace being grey-speckled; a submarginal series of chestnut-red lunules: hind wing grey-speckled along anterior border, and with a broad greyish-ochreous fascia ascending from anal angle. Cilia of both wings greyish-ochreous. Body greyish-ochreous; tegulæ and abdominal dorsal bands dark chestnut-red; antennæ and palpi beneath also chestnut-red.

Expanse 2 inches.

Hab. Calcutta district. In coll. F. Moore.

This specimen was reared by Mr. Arthur Grote at Allipore near Calcutta, from a larva feeding, in September, on *Hyperanthera*.

Fam. CALPIDÆ.

CALPE BICOLOR, n. sp.

Fore wing of a purplish brownish-ochreous, with greyish interspaces between the browner oblique fasciæ, the line traversing the disk from the apex red, and the numerous slender strigæ distinct; some black and white speckles on the veins near the outer margin: hind wing entirely clear yellow. Thorax, palpi and fore legs above brownish-ochreous, grey-speckled; abdomen and legs yellowish. Underside yellowish-ochreous, palest on hind wing. Cilia of fore wing brown.

Expanse $2\frac{1}{3}$ inches.

Hab. Solun, Punjab (N.W. India). In coll. F. Moore.

Near to *C. ophideroides*, but very distinct. It is a third less in size, the fore wing being of an entirely different colour, and is marked similarly to *C. minuticornis* and its allies.

CALPE MINUTICORNIS.

Calpe minuticornis, Guén. Noct. ii. p. 374.

Nearest allied to *C. thalactri*, but is a smaller insect; fore wing browner in colour and with grey-washed interspaces between the oblique fasciæ; the hind wing is also darker, and has a perceptibly darker outer margin; underside of fore wing uniformly pale dusky brownish-ochreous throughout, and the hind wing has a more decidedly darker marginal border.

Expanse $1\frac{6}{8}$ inch.

Hab. India (Bombay, Darjiling); Ceylon; ? Java.

Fam. GONOPTERIDÆ.

GONITIS FULVIDA.

Anomis fulvida, Guénée, Noct. ii. p. 397 (1852), ♀.

Gonitis guttanivis, Walker, Catal. Lep. Het. B. M. xiii. p. 1003 (1857), ♂.

Male. Fore wing ochreous-red, covered with numerous ochreous-yellow scales; crossed by a purple-black oblique waved antemedial line and a medial line, the latter bent outward below the reniform mark and thence zigzag upward to the costa; an indistinct dusky zigzag submarginal fascia; the veins outward from the medial line speckled with purple-black and grey; a prominent white orbicular spot, and an oval spot bordering the lower end of the dusky grey reniform mark: hind wing pale ochreous-brown. Cilia edged with white. Thorax and head reddish ochreous; abdomen, palpi, and legs ochreous-brown.

Female paler; fore wing with the transverse lines more slender and less distinct, the antemedial and lower part of the medial line angular; orbicular white spot very minute; reniform indistinct and not white at lower end; veins externally less distinctly speckled.

Expanse $1\frac{1}{2}$ to $1\frac{3}{4}$ inch.

Hab. India (Darjiling, Khasia hills, Canara); Ceylon; Java.

ARTHISMA, n. g.

Male. Fore wing elongated, somewhat narrow, apex acute; exterior margin oblique and angular in the middle, posterior margin angular near the base; costal vein extending two thirds the margin; first subcostal emitted at half length of the cell, second at one eighth, trifurcate, the third being thrown off at one sixth from base of second, and the fourth close to apex at one eighth from base of third, fifth from end of the cell and slightly touching third near its base; cell long, rather broad; discocellular slightly bent near both ends, radials from the angles; upper median from above end of the cell, middle median from the end, and lower at one half before the end; submedian slightly concave near the base. Hind wing short; anterior margin much arched at the base; exterior margin very oblique, scalloped, and deeply cleft between the lower median and submedian veins, the cilia fringing the margin on both sides to the end of the incision; abdominal margin long; subcostal vein looped to costal at its base; cell very short, less than one third the wing; two subcostal branches from end of the cell; discocellular concave, slightly bent near its lower end; radial from the angle; two upper medians at one fourth beyond end of the cell, lower median at one half before the end; submedian much undulated; internal slightly recurved, and apparently with a short second inner veinlet lobed to it near the base. Body moderately slender, abdomen long; palpi long, slender, ascending, second joint projecting above the vertex, third slender and nearly of equal length to second; legs slender; antennæ very finely pectinated.

ARTHISMA SCISSURALIS.

Male. Dull ochreous-red: fore wing with an outwardly oblique subbasal very indistinct yellowish lunular band, a recurved discal similar band composed of broader lunules, and an outer submarginal zigzag less distinct and narrower band, a yellowish slender discocellular lunule, and a minute white orbicular spot; hind wing with an indistinctly paler medial fascia. Cilia edged with ochreous-white. Body and palpi ochreous-red; legs darker red above, fore legs with white tibial streak and tarsal bands.

Expanse $1\frac{4}{10}$ inch.

Hab. Singapore. In coll. F. Moore.

RUSICADA ALBITIBIA.

Gonitis albitibia, Walker, Catal. Lep. Het. B. M. xiii. p. 1001 ♀.

Rusicada nigratarsis, Walker, l. c. p. 1006, ♂.

Male. Fore wing dark purplish reddish-ochreous, palest and blotchy on posterior border; crossed by a darker oblique zigzag antemedial and a medial line, the latter bent below the reniform mark, and thence sinuous upward to the costa; a less distinct submarginal dark zigzag slender fascia; an indistinct minute white orbicular spot and a grey lobed reniform mark; cilia purplish-brown:

hind wing pale brown; cilia edged with cinereous white. *Female* paler coloured, marked as in male. Thorax, head, palpi, and legs above dark reddish-ochreous; tarsi with pale bands, tibial tuft in female white externally.

Expanse, ♂ $1\frac{3}{10}$, ♀ $1\frac{7}{10}$ inch.

Hab. Ceylon (*Mackwood*); Calcutta and Darjiling (*Atkinson*).
In coll. F. Moore.

RUSICADA DIVERSALIS, n. sp.

Male. Fore wing purplish reddish-ochreous, of a uniform tint throughout the wing; crossed by a very indistinct darker waved antemedial line, and a slightly more distinct grey-bordered lunular postmedial zigzag line, beyond which is a distinct submarginal series of black-pointed spots; minute pale orbicular and reniform dots very indistinct; cilia edged with black: hind wing dusky brown, darkest along the outer border; cilia reddish-ochreous, edged with paler ochreous. Thorax, head, palpi and legs above reddish-ochreous; tarsi with pale bands; antennæ very minutely pectinated.

Expanse $1\frac{4}{5}$ inch.

Hab. Singapore. In coll. F. Moore.

Allied to *Gonitis brunnea*, which has similar markings on fore wing, but the antennæ are deeply pectinated.

GONITIS METAXANTHA.

Gonitis metaxantha, Walker, Catal. Lep. Het. B. M. xiii. p. 1005 (1857).

Fore wing ochreous-red, numerously covered with ochreous-yellow scales; crossed by a deeper red angular antemedial and a zigzag discal line, and a pale-bordered dusky submarginal zigzag fascia; veins externally grey-speckled; a yellowish blotch bordering the medial line below the cell, this blotch being less distinct in the female; a very minute grey-white orbicular dot, and an indistinct dusky-grey reniform mark, the upper part of the latter being nearly obsolete: hind wing dusky ochreous-brown. Cilia edged with ochreous-white. Thorax, head, palpi, and legs ochreous-red; abdomen brown.

Expanse $1\frac{1}{2}$ to $1\frac{3}{4}$ inch.

Hab. Cherra Punji; Darjiling (*Atkinson*).

GONITIS TRILINEATA, n. sp. (Plate VI. fig. 1.)

Fore wing purplish red, numerously covered with minute whitish-ochreous scales, which are most dense along the costal border; crossed by a whitish ochreous outwardly-oblique basal line, a sub-basal narrower, nearly straight line, and a medial line, which is curved outward from below end of the cell and then ascends the disk to the costa, being also angled on the upper median and lower subcostal veins; a less distinct submarginal lunular zigzag line; a pale disco-cellular line from angle of medial transverse line; a very small white orbicular spot; cilia red; veins externally lined with ochreous

and black speckles: hind wing and abdomen pale brownish ochreous; cilia whitish; thorax, palpi, and legs above purplish red.

Expanse $1\frac{3}{8}$ inch.

Hab. Bombay. In coll. F. Moore.

Genus *THALATTA*, Walker.

Thalatta, Walker, Catal. Lep. Het. B. M. xiii. p. 996.

THALATTA ALBIORBIS, n. sp.

Fore wing dark purplish brown, crossed by a postmedial indistinct outwardly-oblique waved brown line; a prominent pure-white orbicular spot: hind wing greyish brown; cilia white. Underside purplish greyish brown; hind wing brown-speckled. Palpi and legs dark purple-brown.

Expanse $1\frac{2}{10}$ inch.

Hab. Ceylon. In coll. F. Moore.

Allied to *T. præcedens*, Walker.

THALATTA MODESTA, n. sp.

Fore wing greyish purple-brown, crossed by a postmedial indistinct pale-bordered brown line; hind wing cinereous-brown. Body, palpi, and legs brown.

Expanse $1\frac{2}{10}$ inch.

Hab. Ceylon. In coll. F. M. Mackwood.

Fam. TOXOCAMPIDÆ.

APOPESTES INDICA, Moore.

Upperside—fore wing with basal two thirds brownish-grey, showing but very few indistinct short blackish strigæ, these appearing only contiguous to and beyond a transverse row of short longitudinal submarginal streaks; reniform mark blackish with grey-white border; a white dot in middle of cell; a series of blackish spots on costa; a prominent black lunular marginal line: hind wing pale brown. Body brown; palpi and tarsi black-speckled. Underside glossy pale greyish brown; a narrow transverse discal and submarginal streak and a short discocellular streak dusky brown.

Expanse $2\frac{4}{8}$ inches.

Hab. Manpuri, N.W. Provinces (*C. Horne*). In coll. F. Moore.

Has much the aspect of *Ophiodes trapezium*, and is allied to *A. phantasma* from the Altai; but differs in having narrower wings, and in the absence of the distinct mottling and medial transverse wavy bands on fore wing of the latter species.

Fam. POLYDESMIDÆ.

Genus *DONDA*.

Donda, Moore, Desc. Lep. Coll. Atkinson, Asiat. Soc. Bengal, p. 161 (1882).

Fore wing elongated, less triangular than in *Oromena*; hind wing somewhat shorter, exterior margin more convex; venation similar.

Body stouter; palpi compactly clothed, terminal joint more slender; antennæ simple in both sexes. Allied to *Belciana*.

DONDA EURYCHLORA.

Daudaca eurychlora, Walk. Catal. Lep. Het. B. M. p. 1670.

Hab. Canara (*Ward*); Darjiling (*Atkinson*).

DONDA STRIATOVIRENS, n. sp. (Plate VI. fig. 2.)

Female. Fore wing blackish cupreous-brown, crossed by a basal, an ante- and postmedial, and a submarginal olive-green sinuous-bordered bands, which are traversed by black sinuous lines; reniform mark green, and shaped like a letter K; a marginal row of green-bordered black cordate spots; the interspaces between the transverse bands also more or less green-speckled: hind wing cupreous-brown, with a marginal row of small green-bordered blackish lunules ending in two streaks at the anal end. Thorax, palpi, and legs cupreous-brown; thorax and fore tibiæ above green-speckled; legs with pale bands.

Expanse $2\frac{3}{8}$ inches.

Hab. Cherra Punjee (*Austen*). In coll. F. Moore.

DONDA ORNATA, n. sp. (Plate VI. fig. 3.)

Female. Fore wing dark cupreous-brown, crossed by a basal, an antemedial, and a postmedial black-bordered olive-grey-speckled lunulated bands, the two former confluent grey-speckled along posterior border; an olive-grey-speckled lunulated patch on the middle of exterior border, and some lunulate streaks ascending to apex; a small white orbicular spot, and a prominent white-lined reniform mark; the medial area between the transverse lines black-speckled: hind wing ænescent yellow, with a broad even-bordered cupreous-brown marginal band, with a slight white sinuous streak from anal angle. Thorax, head, palpi, and legs above chestnut-brown; palpi and legs with yellowish bands; abdomen ænescent yellow, with slight blackish dorsal tufts.

Expanse ♀ $1\frac{6}{8}$ inch.

Hab. Bombay. In coll. F. Moore.

Genus PANDESMAS, Guén.

Syn. *Cerbia*, Walker.

PANDESMAS ANYSA.

Pandesma anysa, Guén. Noct. ii. p. 439 (1852).

Cerbia fugitiva, Walker, Catal. Lep. Het. B. M. xiv. p. 1365.

Male and Female. Differ from *P. quenavadi* in their smaller size and paler grey colour; fore wing with similar transverse markings, which stand out regularly: hind wing with a narrower, paler, and more visibly transverse streaked outer fascia. Underside whiter, with much less distinct and narrower outer band.

Expanse $1\frac{5}{10}$ inch.

Hab. N.W. India (Rawul Pindee); Bombay. In coll. F. Moore.

PANDESMA SIMILATA, n. sp.

Smaller than *P. anysa*. Fore wing brownish grey, densely speckled; markings similar, distinctly formed but less visibly separated: hind wing with browner outer band. Underside white, with more prominent outer band than in *P. anysa*.

Expanse $1\frac{2}{10}$ inch.

Hab. N.W. India (Rawul Pindee; Allahabad). In coll. F. Moore.

Fam. CATEPHIIDÆ.

ERCHEIA PANNOSA, n. sp.

Allied to *E. costipannosa*. Fore wing comparatively shorter and broader, and of a pale ochreous tint. *Male* with the costal patches darker, the basal less sinuous, the apical shorter, the transverse double line less distinct, the discocellular or reniform mark elongated, and either white or white-bordered, the mark below the cell shorter: hind wing similarly marked. *Female* with black patches and less distinct transverse lines.

Expanse, ♂ $1\frac{6}{8}$, ♀ 2 inches.

Hab. S. India (Malabar); Ceylon. In coll. F. Moore.

ERCHEIA UNIFORMIS, n. sp.

Male and Female. Fore wing of a more uniform brown colour, darkest along the costal area; the transverse sinuous lines more distinct than in *E. pannosa*; the reniform mark whitish-lined, and two small black-lined marks below it, the mark between the median and submedian veins very small.

Expanse, ♂ $1\frac{5}{8}$, ♀ $1\frac{7}{8}$ inch.

Hab. S. India (Malabar). In coll. F. Moore.

Fam. EREBIIDÆ.

SYPNA CONTELLATA, n. sp.

Fore wing dark umber-brown, with four transverse equidistant linear series of pure-white spots and numerous very minute intervening dots, and a floreate cluster of white spots forming the reniform mark: hind wing paler brown, with paler medial and submarginal fasciæ, and a lower marginal row of pure-white spots. Underside very pale brownish-ochreous, with a narrow inner and broad outer dusky-brown band, the latter traversed by a waved pale line.

Expanse $2\frac{3}{8}$ inches.

Hab. Dharmasala (*B. Powell*). In coll. F. Moore.

SYPNA RUBRIFASCIA, n. sp.

Intermediate between *S. fraterna* and *S. curvilinea*. Darker in colour than either, the fore wings comparatively narrower than in *S. curvilinea*; the interspace between the medial transverse lines wider and distinctly divided by pale vein-lines; the postmedial fascia brighter coloured; the marginal spots are prominently blue-

speckled: hind wing with less distinct pale fasciæ, and the margin with a blue lunular line. Underside with less-defined fasciæ.

Expanse $2\frac{1}{8}$ inches.

Hab. Darjiling. In coll. British Museum.

SYPNA PRUNOSA, n. sp.

Male. Allied to *S. moorei*. Dark purplish brown; fore wing with similar transverse band, except that its outer border is irregular and encompasses the entire reniform mark: hind wing with two pale zigzag fasciæ, the lower being nearer the margin; the marginal lunules distinct and bordered with bluish-grey.

Expanse $2\frac{2}{8}$ inches.

Hab. Darjiling. In coll. F. Moore.

SPYNA FRATERNA, n. sp.

Allied to *S. curvilinea*; comparatively smaller. Fore wing with the broad medial band of a uniform dark-brown colour throughout, its inner-bordered duplex line indistinctly ochreous, and the outer line bright ochreous; the discal area broadly, and an apical patch also bright ochreous; a minute white orbicular dot, and a slender indistinctly defined reniform mark: underside of a brighter and paler ochreous tint, with a narrower and more recurved transverse inner dusky fascia, and comparatively broader outer fascia.

Expanse 2 inches.

Hab. Darjiling. In coll. F. Moore and British Museum.

SYPNA RENISIGNA, n. sp.

Male. Dark purplish brown. Fore wing crossed by a broad sub-basal and antemedial blackish band, bordered outwardly by a slender duplex black line extending irregularly outward beyond the cell and terminating on the costa above the end; a submarginal blackish zigzag narrow band, and a marginal row of slender ochreous-bordered black lunules; a distinct white minute orbicular dot and large prominent reniform mark: hind wing with a blackish subbasal and a discal suffused band, and a marginal row of slender pale-bordered lunules. Underside pale brownish ochreous: fore wing with three distinct medial transverse narrow black bands; hind wing with a narrow medial and a broad discal band.

Expanse $1\frac{6}{8}$ inch.

Hab. Khasia hills. In coll. F. Moore.

ARGIVA STRIGIPENNIS, n. sp.

Allied to *A. hieroglyphica*; smaller in size. Both sexes pale ochreous-brown, much paler than the female of *A. hieroglyphica*. Upperside with more delicate short strigæ, which are sparsely disposed between the three transverse irregular darker brown fasciæ; the fasciæ in both sexes (especially in the male) showing more prominently than in female *A. hieroglyphica*; the oblique short subapical band at upper outer end of the medial fascia, in both sexes, is brownish-ochreous, and the zigzag outer margin of the medial fascia

also slenderly bordered by brownish-ochreous; lobate reniform mark half the size of that in *A. hieroglyphica*, and not darker than the fasciæ. Underside ochreous-brown, the marginal borders paler, the short oblique subapical band and ill-defined interrupted slender sinuous fascia ochreous-white.

Expanse, ♂ $2\frac{5}{8}$, ♀ $2\frac{6}{8}$ inches.

Hab. Khasia hills (*Austen*). In coll. F. Moore.

NYCTIPAO PRUNOSA, n. sp.

Allied to *N. glaucopis*. Smaller; colour of a bluer glossy iron-grey purplish-brown tint; fore wing with a smaller retort mark, the transverse pale zigzag line linear, not composed of distinct lunate spots as in *N. glaucopis*; hind wing with smaller white subapical spots, the second spot being lunate; on the underside the transverse series of spots are also much smaller and linear.

Expanse $3\frac{1}{2}$ inches.

Hab. Kussowlie, N.W. Himalaya. In coll. F. Moore.

Fam. OMMATOPHORIDÆ.

SERICIA CALAMISTRATA, n. sp.

Allied to *S. substruens* (*Tavia substruens*, Walk.).

Markings on both wings similar, except that in the fore wing the prominent discal white-speckled mark beyond the cell is formed by a uniformly rounded duplex line, with a more slender lower terminal inner end, and with its upper costal end more acutely sinuous.

Expanse $2\frac{1}{2}$ inches.

Hab. Andaman Isles. In coll. F. Moore.

Fam. HYPOPYRIDÆ.

HYPOPYRA PALLIDA, n. sp.

Male. Similar to *H. vesperilio*. Much paler in colour: fore wing with the subbasal transverse fascia less curved; oblique medial lines darker, the contiguous and outer sinuous fasciæ more distinct, and the marginal lunular line less defined; three prominent small black spots encircled by greyish-white, and an indistinct discocellular lunule: hind wing with two distinct brown medial lines and two contiguous lines, two distinct outer sinuous fasciæ, and a marginal lunular brown line.

Female. Much paler than the same sex of *H. vesperilio*; the markings indistinct: fore wing with three small indistinct black-centred grey-bordered spots, and slender discocellular lunule.

Expanse, ♂ $2\frac{3}{4}$, ♀ 3 inches.

Hab. Ceylon. In coll. F. Moore.

Fam. OPHIUSIDÆ.

NAXIA DUPLEXA, n. sp. (Plate VI. fig. 4.)

Near to *N. calefaciens*. *Female.* Fore wing differs in the subbasal line being curved inward and slenderly bordered on each side

by a lilac-purple line, and the discal line being much less acutely sinuous, the intermediate lilac fascia more erect, not dark-bordered on its outer margin, and not being suffused to the discal line; orbicular spot small and white: hind wing uniformly ochreous-brown.

Expanse $2\frac{1}{10}$ inches.

Hab. Darjiling. In coll. F. Moore.

OPHIUSA ACUTA, n. sp. (Plate VI. fig. 5.)

Allied to *O. falcata*, Moore (Desc. Lep. Coll. Atk. p. 171, 1882). Fore wing differs in the duplex subbasal line being more erect and not recurved, the pale lilac fascia narrower, the discal curved line nearer the extreme margin, thus making the dark-brown interspace much wider, its angle near the costa is also much more acute, and the line from the angle curved upward to the apex; hind wing darker.

Expanse 2 inches.

Hab. Khasia hills (*Austen*). In coll. F. Moore.

Fam. THERMESIIDÆ.

DURDARA FENESTRATA, n. sp. (Plate VI. fig. 6.)

Red; both wings crossed by several linearly disposed delicate black strigæ: fore wing with a lower discal black-bordered trilobate spot, the upper and lower lobes being diaphanous white, the middle lobe broken and slightly yellowish; a slight dusky spot at end of the cell: hind wing also with a slight dusky spot at end of the cell. Underside duller red, marked as above, the fore wing also with a slight short fascia below the apex.

Expanse $1\frac{1}{4}$ inch.

Hab. Bombay (*Wilkinson*). In coll. F. Moore.

SONAGARA BIVITTATA, n. sp. (Plate VI. fig. 7.)

Allied to *S. decussata*, one third less in size. Both wings crossed by numerous linearly-disposed black strigæ, which, across the wings and along the outer border, are darker and form two distinct darker bands. On the underside these strigose bands are also present.

Expanse $\frac{8}{10}$ inch.

Hab. Andaman Isles. In coll. F. Moore.

SONAGARA DECUSSATA, n. sp. (Plate VI. fig. 8.)

Pale dull yellowish-ochreous; both wings crossed by numerous short black strigæ, which assume the letter X here and there between the outer veins; a small quadrate black discocellular spot on both wings.

Expanse $1\frac{1}{4}$ inch.

Hab. N.E. Himalaya (*Farr*). In coll. F. Moore.

SONAGARA VIALIS, n. sp. (Plate VI. fig. 9.)

Male. Allied to *S. strigipennis*. Differs in the narrow band from the apex of fore wing to middle of abdominal margin being more

prominent, the delicate transverse strigæ also more distinct; the fore wing not having the outer line from the band to posterior angle; and this outer line on the hind wing, instead of terminating above the anal angle, extends to near middle of the exterior margin; the fore wing also has a large blackish discocellular spot. Underside marked as above.

Expanse $1\frac{6}{10}$ inch.

Hab. Himalaya (*Capt. Magee*). In coll. F. Moore.

CAPNODES STELLATA, n. sp.

Upperside dull ochreous-red; fore wing crossed by an antemedial and a postmedial zigzag black-speckled white-spotted line, terminating in a more prominent white spot on the costa, with a brighter red zigzag fascia between them, and a submarginal double fascia; a white spot also at base of wing, and a marginal row of black dots: hind wing with a medial transverse zigzag black-speckled white-spotted line, with less distinct intervening zigzag fasciæ, and a marginal row of dots. Underside uniform dull umber-brown.

Expanse $1\frac{8}{10}$ inch.

Hab. Singapore. In coll. F. Moore.

Fam. FOCILLIDÆ.

ACHARYA COSTALIS, n. sp. (Plate VI. fig. 10.)

Chestnut-brown, brightest on the basal area; both wings with a blackish medial transverse fascia, a discal sinuous white-pointed black line, a submarginal narrow ochreous line, with slender ochreous streaks from the line to the exterior margin, and intervening black dot between each vein: fore wing with a broad ochreous-black-speckled costal band, the submarginal line angled in the middle, a white orbicular spot, and a white-speckled reniform mark. Underside uniform pale brown, with indistinct transverse dusky sinuous line and discocellular spot. Body chestnut-brown; middle of thorax ochreous; palpi bright ochreous.

Expanse $1\frac{1}{2}$ inch.

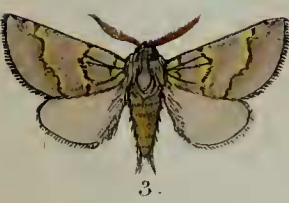
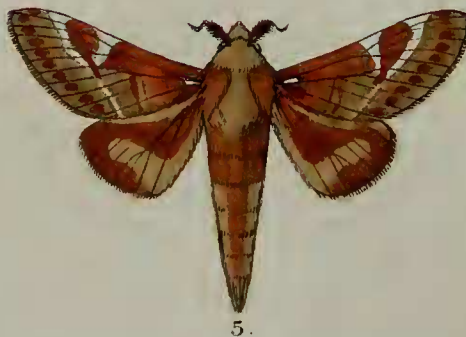
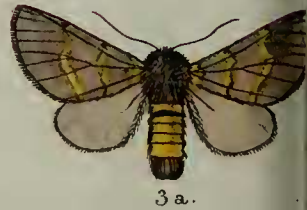
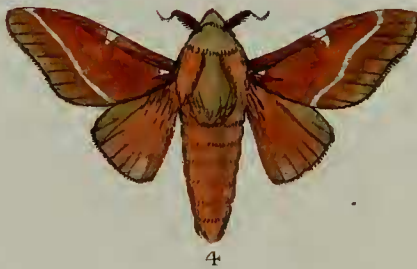
Hab. Andaman Isles. In coll. F. Moore.

Fam. HYPENIDÆ.

BYTURNA, n. g.

Wings very small: fore wing narrow, elongated; costa straight, apex acute, exterior margin slightly convex; costal vein long, extending to two thirds the margin; first subcostal branch emitted at one half, and second at one fourth before end of the cell, second trifurcate, the third being thrown off at three fourths, and fourth from one fourth beyond the base, fifth from end of the cell and looped to fourth close to its base; discocellulars bent at near their upper and lower ends; upper very short, lower very concave, slender; upper radial from angle at end of the cell, lower radial from angle above lower end of the cell; upper median branch from angle at

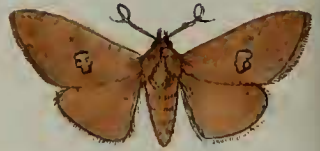








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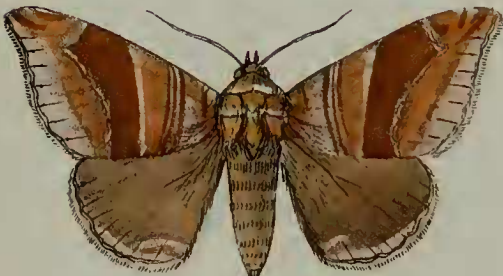
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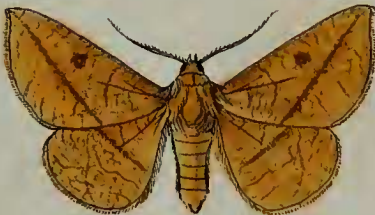
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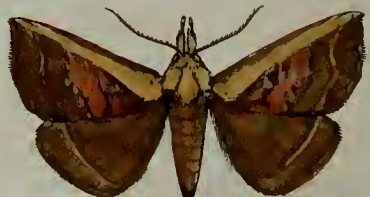
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5.



9.



10.

lower end of the cell, second branch at one eighth and third at one third before its end; submedian straight. Hind wing elongated oval; costal vein straight, extending to apex; two subcostal branches from end of the cell; discocellulars concave, upper longest; radial from their middle; two upper medians from beyond end of the cell, lower at one fourth before its end; submedian and internal vein straight. Body stout; palpi long, ascending, second joint squamose, laterally broadest at the apex, extending to a level with the vertex, third joint slender, naked, about half length of second; antennæ finely setose; legs squamose, fore tibiæ tufted beneath.

This genus has much the appearance of *Rivula*.

BYTURNA DIGRAMMA.

Bocana digramma, Walker, Catal. Lep. Het. B. M., Suppl. p. 1170.

Hab. India; Ceylon.

PASIRA BIATOMEA, n. sp.

Male. Pale ochreous: fore wing with two minute black discocellular spots, another spot above the submedian vein, and a marginal row of still smaller dots, the apical dot most prominent: hind wing with indistinct brownish-ochreous outer border. Underside brighter coloured: hind wing brown-speckled along the costal border and apex, with a blackish discocellular streak and a marginal row of small dentate spots.

Expanse 1 inch.

Hab. Ceylon. In coll. F. Moore.

A larger species than *P. ochracea* from Calcutta.

Fam. PYRALIDÆ.

LEUCINODES DISCISIGNA, n. sp.

Ochreous-white: fore wing with a short basal and three middle transverse ochreous-brown bands, the outer band bordered by a slender black lunular line; a submarginal sinuous white line, bordered inwardly by black at its apical and posterior end; a prominent white S-shaped discocellular spot; hind wing with a slight submarginal and discal sinuous brown line.

Expanse 1 inch.

Hab. Darjiling. In coll. Dr. Staudinger and F. Moore.

EUDOREA LATIVITTA, n. sp.

Fore wing ochreous-white, with a short basal brown streak, a broad medial transverse angular bordered band, and a submarginal sinuous fascia, the interspaces brown-speckled; two black dots at end of the cell, and a row on submargin: hind wing cinereous-white.

Expanse $\frac{6}{8}$ inch.

Hab. Darjiling. In coll. Dr. Staudinger and F. Moore.

EXPLANATION OF THE PLATES.

PLATE V.

- Fig. 1. *Aloa marginata*, n. sp., p. 15.
 2. *Baradesa lithosioides*, n. sp., p. 17.
 3, 3 a. *Thaumatopæa checla*, n. sp., p. 18.
 4. *Taragama intensa*, n. sp., p. 18.
 5. — *hyperantheræ*, n. sp., p. 18.

PLATE VI.

- Fig. 1. *Gonitis trilineata*, n. sp., p. 21.
 2. *Donda striatovirens*, n. sp., p. 23.
 3. — *ornata*, n. sp., p. 23.
 4. *Naxia duplexa*, n. sp., p. 26.
 5. *Ophiusa acuta*, n. sp., p. 27.
 6. *Durdara fenestrata*, n. sp., p. 27.
 7. *Sonagara bivittata*, n. sp., p. 27.
 8. — *decussata*, n. sp., p. 27.
 9. — *vialis*, n. sp., p. 27.
 10. *Acharya costalis*, n. sp., p. 28.

4. Descriptions of Five new Species of Shells.

By G. B. SOWERBY, Jun.

[Received January 8, 1883.]

(Plate VII.)

LIMA GOLIATH, sp. n. (Plate VII. fig. 3.)

Shell rather obliquely oval, white, semitransparent, striated at the sides and on the auricles, otherwise smooth; anterior side with a depressed lunule, making a straight outline extending from the umbones about half the length of the shell; thence the outline is curved; umbones acute; cardinal area deeply excavated; anterior auricles small and very sloping, posterior large; valves nearly closed on the hinder side, slightly gaping in front.

Long. 150, lat. 110 mill.

Hab. Japan.

This magnificent species, the largest of the genus, appears to have been hitherto undescribed. It is of stouter substance and not so inflated as the Norwegian species (*L. excavata*). Its surface is smooth, excepting at the sides, which are rather roughly striated. The cardinal area is larger and deeper than in the specimens before me of *L. excavata*.

This specimen was sent to me from Japan, and now belongs to the rich collection of Dr. Prevost, of Alençon. Another specimen has recently been brought by Dr. Hungerford from Japan, the latter being a very old shell, larger and thicker than the type, with its surface much eroded and worm-eaten.

THRACIA JACKSONENSIS, sp. n. (Plate VII. fig. 5.)

Shell obliquely oval, white, covered with a very thin pale epidermis,

rather thin, inequilateral, umbones posterior; both valves faintly irregularly wrinkled with concentric striæ; dorsal margin posteriorly sloping to an angle; anterior side arched, and obliquely sloping towards the ventral margin; posterior obliquely truncated; ventral margin very slightly arched; umbonal ridge obtusely angulate; hinge with cartilage-processes rather small.

Long. 35, alt. 26, lat. 13 mill.

Hab. Port Jackson (*Brazier*).

Another interesting species of the genus *Thracia* from the same locality as the one described by Mr. Angus in the 'Proceedings' of 1869, and discovered by the same persevering and intelligent collector.

TELLINA BRAZIERI, sp. n. (Plate VII. fig. 2.)

Shell transversely ovate, nearly equilateral, moderately thin, dull yellowish white, without markings; concentrically laminated, laminae very fine and thread-like; umbones acute, rather prominent, approximate; anterior side rounded, posterior truncated; anterior dorsal margin incurved, posterior sloping in a straight line to form an angle with the side; ventral margin arcuate; dorsal area slightly depressed; ligament long and narrow.

Long. 8, alt. 7, lat. 2 mill.

Hab. Port Jackson (*Brazier*).

A remarkable little species having the form and external appearance of an *Amphidesma*.

TELLINA MODESTA, sp. n. (Plate VII. fig. 1.)

Shell transversely ovate, rather inequilateral, compressed, thin, white, shining; concentrically very finely striated; anterior side rounded, posterior slightly flexuous; dorsal margins sloping; ventral margin strongly arcuate; umbones small, approximate; dorsal area very slightly impressed; ligament moderate.

Long. 12, alt. 9, lat. 3 mill.

Hab. Port Jackson (*Brazier*).

A delicate shining white shell of very simple character.

PECTUNCULUS ROBUSTUS, sp. n. (Plate VII. fig. 4.)

Shell suborbicular, solid, subequilateral, very pale yellowish brown, here and there sparingly banded and spotted with darker brown; anterior side rounded, posterior angulated, slightly incurved and depressed above the angle; dorsal margin straight; ligamentary area narrow; umbones rather acute; valves radiately ribbed (ribs prominent, rounded, close-set, about 23 in number, much narrower above the angle), concentrically striated; striæ thread-like, crossing ribs and interstices.

Long. 40, alt. 37, lat. 22 mill.

Hab. —?

A very distinct and characteristic species.